

# Student engagement in online delivery of mathematics and statistics modules

*- a personal account -*

Thomas Madsen  
School of Computing & Engineering, UWL

*Festival of Learning and Teaching 2021*

# My maths and stats teaching before March 2020

Pre-COVID teaching reflects typical mathematics/statistics lecturer: blackboard based classroom teaching. [Passive learning?](#)

*Use of technology before March 2020:*

- VLE for announcements, weekly notes and problem sheets, discussion boards.
- Lecture slides (depending on nature of module).
- Use of mathematical and statistical software (Excel, R, Python, MATLAB, Mathematica, SageMath).

Main engagement through synchronous faculty-student and student-student communication and collaboration.

*Should we aim for similar engagement when teaching online?*

# Are tablets a good online alternative to blackboards?

Advanced mathematics and statistics concepts difficult to teach via slides. Blackboards slow us down, prompt mistakes and student interaction.

*My experience:*

- XP-Pen and MS Whiteboard for webinars and feedback.
- *Advantages:* Good for formulae, derivations and drawings. Slows you down. Can export and share with students. Can be used anywhere.
- *Disadvantages:* Requires some practice. May have to flip between applications regularly.

*For how long do students "engage" in a typical webinar?*

Module	Statistics (slides)	DEs (tablet)
Avg proportion	71%	89%

*Suggesting a (significant?) difference in favour of tablets.*

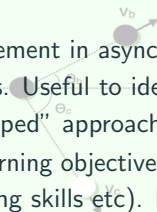
*This is supported by student feedback as well.*

# Quizzes: do students participate & do they work?

Quizzes can be good way to engage students in asynchronous activities.

*My experience:*

- Predominantly implemented using BB's test tools though alternatives such as NUMBAS and STACK exist.
- *Advantages:* Facilitate student engagement in asynchronous activities. Easy to reuse. Good for large cohorts. Useful to identify response patterns (particularly relevant in "flipped" approach).
- *Disadvantages:* Focus on low level learning objectives. Can only check factual knowledge (not problem solving skills etc). Limited feedback. Time consuming to construct.



a) *Are quizzes equally useful for all (asynchronous) phases?*

- Investigate quizzes (stats): 62%.
- Consolidate quizzes (discrete maths): 41% with weak (but significant) positive correlation between quiz scores and final test score.

# Videos & recordings: do these reduce engagement?

Videos/recordings can be good supplement to webinars but play *precarious* role in context of student engagement.

*My experience:*

- Mainly short introductory videos, using Panopto, and recording of Collaborate sessions.
- *Advantages:* Flexibility for students. Students can (re)watch complicated derivations at own pace. Good for revision.
- *Disadvantages:* Risk of reduced attendance and student focus during webinars. May affect faculty-student interaction. Videos time consuming to produce and can get too "polished".

Panopto produced videos in stats module on average viewed by 14% of students (compare with 62% quiz participation in same module, cf. p.4). No data for Collaborate recordings, but student feedback suggests these have been (too?) popular.

## Face-to-face return: FLEXibility with care

With care, above tools could be used in face-to-face (or hybrid) setting both to facilitate student engagement *and* add flexibility.

- *Tablets* are here to stay as can (almost fully) replace blackboards. Could enhance use to let students participate as well.
- *Quizzes* good tool for prompting asynchronous engagement related to simpler concepts (particularly in flipped setting).
- Aim to continue delivering sessions via Collaborate but plan *recordings* carefully and monitor use.

*Good use of technology can increase student engagement, particularly by allowing for more focused faculty-student interactions.*

# Any questions?

## Selected references



E-Assessment in Mathematical Sciences

<https://eams.ncl.ac.uk/>



N. Calder, J. Jafri and L. Guo

**Mathematics Education Students' Experiences during Lockdown:  
Managing Collaboration in eLearning**

*Educ. Sci.* 2021., vol. 11, Apr. 2021.



M. R. Edwards and M. E. Clinton

**A study exploring the impact of lecture capture availability and  
lecture capture usage on student attendance and attainment**

*Higher Education*, vol. 77, Mar. 2019.



P. Maclaren, D. I. Wilson and S. Klymchuk

**Making the point: the place of gesture and annotation in  
teaching STEM subjects using pen-enabled Tablet PCs**

*Teaching Mathematics and its Applications: An International Journal of  
the IMA*, vol. 37, Apr. 2017.



Teaching and Learning Mathematics Online

<http://talmo.uk/index.html>